

# Two New Bulimulid Land Snail Species from Isla Santa Cruz, Galápagos Islands

by

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**Abstract.** Two new species, *Naesiotus steadmani* and *Naesiotus kuberensis* (Bulimulidae), are described from Isla Santa Cruz, Galápagos Islands, Ecuador. These snails are known only from limited shell material collected from surface samples and excavations of fossil deposits in lava tubes.

## INTRODUCTION

RECENT STUDIES OF terrestrial fossils are providing new insights into the evolution and historical distributions of the vertebrate fauna of the Galápagos Islands, Ecuador (STEADMAN, 1981, 1982, in press a, in press b; STEADMAN & RAY, 1982). During their field investigations, Steadman and his colleagues also collected land snail shells from cave excavations and surface samples on Floreana and Santa Cruz islands. These Holocene land snail faunas, which are associated with the fossil vertebrate faunas, are described in detail in another paper (CHAMBERS & STEADMAN, in press). That analysis has revealed two taxa that are distinct at the species level. These two species are described in the present paper.

Recognition of the new species is based on study of the collections of the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), and the California Academy of Sciences, San Francisco (CAS), the reviews of DALL (1896) and DALL & OCHSNER (1928), all published descriptions of the Galápagos bulimulid species, and the analysis of *Naesiotus* characters by BREURE & COPPOIS (1978). Whorl numbers in the data tables were counted to the nearest  $\frac{1}{4}$  whorl.

The present descriptions are based only on shell material; neither living specimens nor preserved soft parts are known to the author. There is evidence of recent declines and likely extinction in Galápagos land snails (CHAMBERS & STEADMAN, in press), so it is possible that both newly described species are already extinct.

## TAXONOMY

Family BULIMULIDAE Tryon, 1867

Genus *Naesiotus* Albers, 1850

*Naesiotus steadmani* Chambers, spec. nov.

### Figure 1

**Description:** Shell conical, consisting of up to 7 whorls, narrowly umbilicate to rimate, reaching 11.8–13.3 mm in height and 6.3–7 mm in width, with proportion of width to height ranging from 0.5 to 0.54 and sides convex in outline. Protoconch consisting of 1.75–2 whorls, with sculpture of fine undulating and anastomosing axial riblets and extremely fine spiral threads. Postembryonic whorls convex and with fine, slightly sigmoid or undulating axial ribs and very fine spiral threads on the first 1.75–2.5 postembryonic whorls, forming small beads at intersections with axial ribs. Sutures weakly impressed. Axial sculpture becoming increasingly more pronounced on body whorl, forming coarse, irregular folds within  $\frac{1}{4}$  turn of the aperture. Base of body whorl flattened, making the shell outline somewhat fusiform. Aperture ovate-lunate, somewhat narrowed by flattened parietal wall. When viewed from side, peristome straight, its plane forming an angle of about 30° with axis of shell. Columellar margin reflected and continuous with a thick parietal callus, basal and palatal margins simple or slightly thickened. Parietal lamella 1–2 mm in length and directed toward midpoint of the outer lip and recessed about 3 mm from outermost



Figure 1

Two views (A and B) of *Naesiotus steadmani* material. Far left, the holotype. Next, three paratypes. Far right, USNM 842297 from Cueva de Kubler. Scale bar is 10 mm.

extent of peristome. Columellar lamella thicker and not as high as parietal lamella and usually extending to the peristome. Palatal thickening extending to edge of peristome. Shell light brown, sometimes with pale spiral band down middle of body whorl, with peristome white.

**Diagnosis:** A *Naesiotus* with a finely sculptured, somewhat fusiform shell, and with parietal and columellar lamellae and a palatal thickening within the aperture.

**Differential diagnosis:** This species resembles in overall form the shell of *Naesiotus sculpturatus* (Pfeiffer, 1846) figured by SMITH (1972), but the latter species lacks apertural lamellae (as does *Naesiotus tanneri* [DALL, 1895]) and is roughly sculptured. *Naesiotus akamatus* (Dall, 1917), *Naesiotus adelphus* (Dall, 1917), *Naesiotus lycodus* (Dall,

1917), and *Naesiotus wolffi* (Reibisch, 1892) have similar apertural features and are about the same height as *N. steadmani*, but all of the former are substantially broader.

**Etymology:** This species is named in honor of Dr. David W. Steadman, pioneer in the study of Galápagos terrestrial fossil faunas.

**Type material:** Holotype (CAS 059358) and 67 paratypes (CAS 038052). The type material was collected on 24 February 1964, by Allyn G. Smith from under lava rocks at a lava cliff west of the DeRoy's house and near the Devine house, Academy Bay, Isla Santa Cruz, Galápagos Islands (according to museum labels and description of Station G-113 in Allyn G. Smith's Station List for the Galápagos International Scientific Project, on file in the

Table 1  
Measurements of some *Naesiotus steadmani*.

	Height (mm)	Width (mm)	Height/width	No. whorls			No. post- protoconchal whorls with spiral cords
				Protoconch	Other	Total	
Holotype (CAS 059358)	12.9	7.0	0.54	1.75	4.75	6.5	1.75
Paratypes (CAS 038052)	13.3	6.9	0.52	1.75	4.75	6.5	2.75
	12.7	6.7	0.53	2	5	7	3
	12.4	6.5	0.52	1.75	5	6.75	3
	11.8	6.3	0.53	1.75	4.75	6.5	3
	12.4	6.5	0.52	2	4.75	6.75	2
	12.7	6.3	0.50	1.75	5	6.75	2.5
USNM 842297	12.6	6.7	0.53	—	—	6.25*	—
Mean	12.6	6.6	0.52	1.8	4.9	6.63	2.6
Standard deviation	0.43	0.26	0.01	0.1	0.1	0.23	0.5

\* Total number of whorls only is given for this shell, which is weathered so that the protoconch is indistinguishable from later whorls.

Department of Invertebrate Zoology of the California Academy of Sciences). There is no indication on the labels or station list that any individuals were collected alive, and many shells are entirely white owing to weathering. Measurements of some of this material are presented in Table 1.

**Additional material:** A single fossil specimen from a depth of 20 to 30 cm in Excavation IIE in Cueva de Kubler (Figure 2), a large lava tube 1.5 km north of Puerto Ayora, Isla Santa Cruz (USNM 842297), collected by D. W. Steadman, E. N. Steadman, and J. R. Hill on 6 November 1980. Excavation IIE is in a deposit of unstratified, undurated, richly fossiliferous sediments. Alongside the much more abundant and mineralized remains of native vertebrates, Excavation IIE contains specimens of rodents (*Mus*, *Rattus*), which were introduced to Santa Cruz in the early 20th century. The age of this deposit is late Holocene, ranging from at least 1750 years BP up until just decades ago. This locality is described in STEADMAN (1981) and CHAMBERS & STEADMAN (in press). USNM 842297 was the only specimen of this species known to the author until the previously collected but unidentified material was found in the collections of the Department of Invertebrate Zoology at CAS.

*Naesiotus kublerensis* Chambers, spec. nov.

Figure 3

**Description:** Shell conical, consisting of up to 7.75 whorls, fairly thin, narrowly umbilicate, reaching 10–12 mm in height and 4.8–5.7 mm in width, with proportion of width/height ranging from 0.4 to 0.51 and sides nearly straight in outline. Suture impressed. Protoconch of 1.5 to 1.75 whorls, sculptured with fine straight axial riblets. Postem-

bryonic whorls convex, very slightly shouldered at periphery, sculptured with fine axial wrinkles that become larger, rougher, and more irregular on later whorls, making last half of body whorl heavily wrinkled or rugose. Spiral sculpture of numerous closely spaced and very fine threads forming fine beads (visible under 10× magnification) as they pass over all but largest axial wrinkles. Peristome elongate-ovate and simple, except columellar margin reflected and continuous with a thin callus on parietal surface; when viewed from side, peristome straight and forming angle of about 25° with shell axis. Small parietal swelling within aperture sometimes present. Color brown or tan to cream, sometimes with pale band just below periphery.

**Diagnosis:** A *Naesiotus* with a slightly elongate bulimoid shell that is sculptured with irregular axial wrinkles that become rugose on the last half of the body whorl. The shell aperture lacks lamellae, although a parietal swelling is sometimes present.

**Differential diagnosis:** This species' overall form is much like that of *Naesiotus hirsutus* Vagvolgyi, 1977, and *Naesiotus jacobi* (Sowerby, 1883), but it has definite axial sculpture, becoming rugose on the body whorl, that is absent in those species. It resembles *Naesiotus rabidensis* (Dall, 1917), but its whorls are not definitely shouldered as in that species. It is stouter but, in other respects, similar to *Naesiotus nesioticus* (Dall, 1896). Shells of *N. kublerensis*, *N. nesioticus*, and *Naesiotus reibischi* (Dall, 1895) have been found together without apparent intergradation in Cueva de Kubler. Fossil records and quantitative morphological analysis of these three species will be presented elsewhere (CHAMBERS & STEADMAN, in press).





Figure 2

Cueva de Kubler, type locality for *Naesiotus kublerensis*, and where a single specimen of *N. steadmani* was collected. Photograph by D. W. Steadman.

**Etymology:** Named for Cueva de Kubler, the type locality.

**Type material:** Holotype (USNM 842298) and 7 paratypes (USNM 842299) were collected by Steadman in December 1980 from surface rubble at the entrance of Cueva de Kubler (Figure 3), about 8 m southwest of Ex-

cavation IIA, Isla Santa Cruz (see comments on this locality under *Naesiotus steadmani*). One additional paratype (USNM 842300) was collected by Steadman, E. N. Steadman, and J. R. Hill from a depth of 0–20 cm in Excavation IIA on 18 November 1980. Additional paratypes were collected from the surface just outside the entrance to Cueva de Kubler to represent a “modern” snail

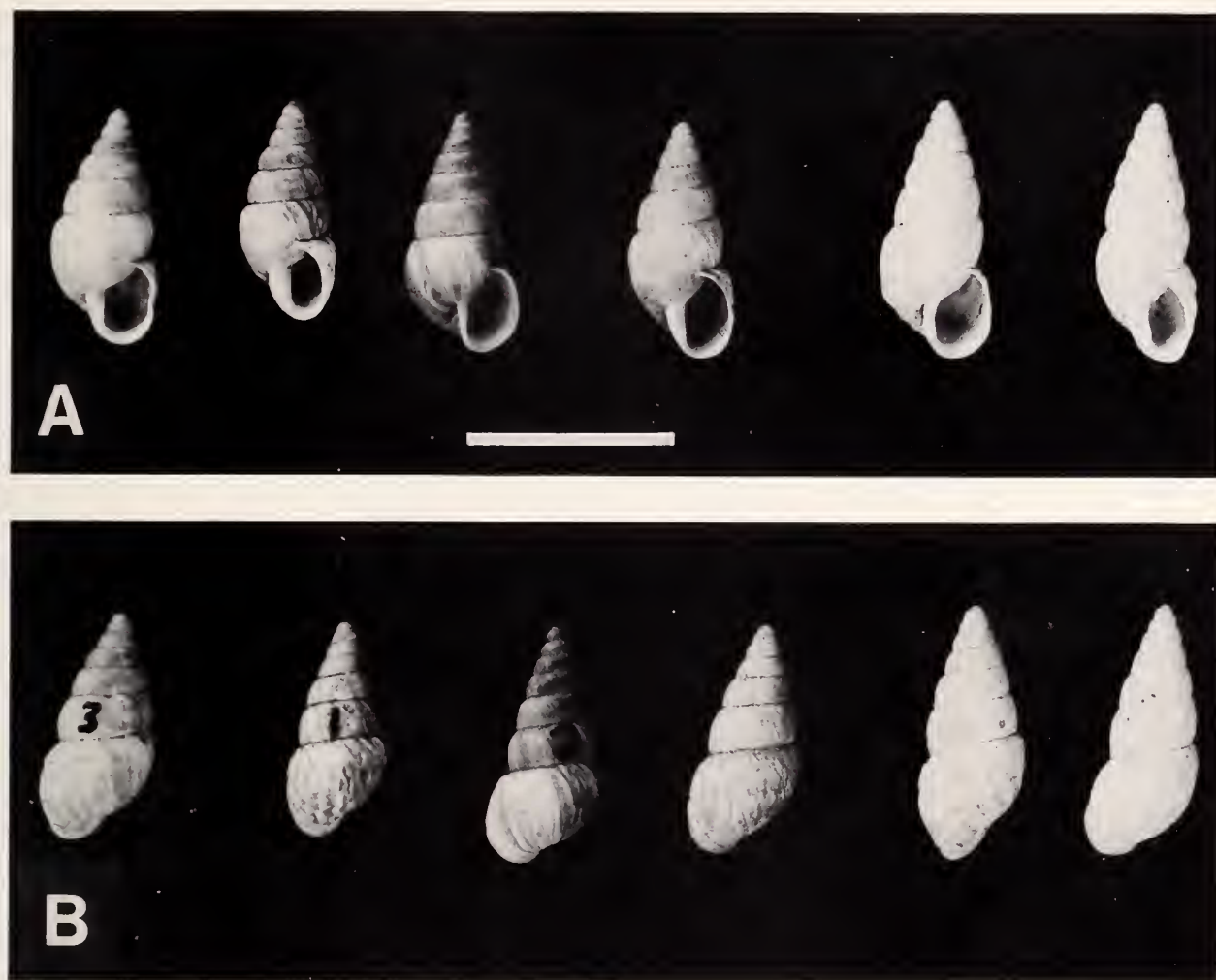


Figure 3

Two views (A and B) of some type material of *Naesiotus kublerensis*. Far left, holotype. Next, two paratypes (USNM 842299) from rubble at the entrance of Cueva de Kubler. Right, three paratypes (USNM 842301) from just outside the entrance of Cueva de Kubler. Scale bar is 10 mm.

sample: 7 in USNM 842301, collected by D. W. Steadman on 25 December 1980, 7 m SSW of the entrance; 5 in USNM 842302, collected by Steadman, P. S. Martín, and M. K. O'Rourke on 19 December 1980, from 8 m SE of the entrance; and 25 in USNM 842303, collected by Steadman on 25 December 1980, from 8 m SW of the entrance. Measurements of some type and other material are presented in Table 2. The specimen from Excavation IIA: 0–20 cm may be anywhere from approximately 1750 years old up to modern. All other type material of *N. kublerensis* was taken from the interstices between boulders. Some shells were rather exposed, while others were fairly sheltered beneath the boulders. All are modern in appearance, although some appear worn and/or bleached, and none were taken as live animals.

**Additional material:** One shell (USNM 842304) collected from the surface near the trail to Tortuga Bay, Santa Cruz, 1 km from the main road on 12 July 1979, by D. W. Steadman and M. Pozo. Four additional lots of this species, collected during the Galápagos International Scientific Project in 1964, were located at CAS. Three of these (CAS 037883, CAS 037963, and CAS 038061) were collected by Allyn G. Smith (Stations G-6, G-77, and G-4 respectively). The fourth lot (CAS 038041) was collected by A. and J. DeRoy. All of the recorded localities are on the "old trail" (described by SMITH, 1972) that connects Bahia Academy with upland areas of Santa Cruz. Smith's labels with CAS 037883, CAS 038041, and CAS 038061 indicate that he considered this a new species. There is no indication that any of this material was taken alive.

Table 2  
Summary of measurements of some shells of *Naesiotus kublerensis*.

	N	Height (mm)	Width (mm)	Height/ width	No. whorls	
					Protoconch	Other
Cueva de Kubler:						
Entrance:						
Holotype (USNM 842298)	1	10.9	5.1	0.47	1.75	4.25
Paratypes (USNM 842299)	2					
Mean		10.7	5.1	0.48	1.75	5.50
Range		10.2–11.2	4.9–5.3	0.47–0.48	1.75	5.25–5.75
Excavation IIA:						
Paratype (USNM 842300)	1	11.3	4.5	0.40	1.75	6
Surface:						
Paratypes:						
USNM 842301	7					
Mean		11.3	5.1	0.45	1.7	5.4
Range		10.4–12.1	4.8–5.4	0.42–0.48	1–1.75	5.25–5.75
Standard deviation		0.7	0.2	0.02	0.1	0.2
USNM 842302	2					
Mean		10.5	5.0	0.48	1.75	5
Range		10.2–10.8	4.8–5.2	0.47–0.48	1.75	5
USNM 842303	7					
Mean		11.4	5.4	0.47	1.6	5.4
Range		10.7–12.0	5.0–5.7	0.44–0.52	1.5–1.75	4.75–6
Standard deviation		0.49	0.29	0.03	0.1	0.4
CAS 037883	2					
Mean		11.6	5.3	0.46	1.75	5.38
Range		11.5–11.7	5.0–5.6	0.43–0.49	1.75	5–5.25
CAS 037963	1	10.0	5.1	0.51	1.75	5
CAS 038061	3					
Mean		10.9	5.0	0.46	1.6	5.2
Range		10.6–11.3	4.9–5.1	0.45–0.46	1.5–1.75	5–5.5
Standard deviation		0.36	0.10	0.01	0.1	0.3

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